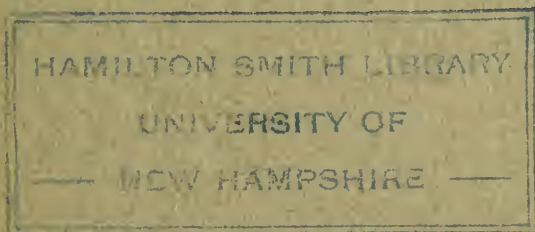


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# BULLETIN OF THE UNIVERSITY OF NEW HAMPSHIRE

Graduate School Number



Vol. XXIX, No. 8    APRIL, 1938

Durham

## BULLETIN OF THE UNIVERSITY OF NEW HAMPSHIRE

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The Bulletin is published in September, October, November, December, January, February, March, and April, and includes:

- The Catalog of the University
- The Report of the President
- The Financial Report
- The Catalog of the Summer School
- The Pictorial Folder
- The Catalog of the Graduate School

and other publications of the University.





# UNIVERSITY CALENDAR

1938-39

## SUMMER SESSION

1938

June 27	Monday	Registration Day
June 28	Tuesday	Classes begin at 8 A. M.
Aug. 5	Friday	Summer Session closes at 4 P.M.

## FIRST SEMESTER

1938

Sept. 13	Tuesday	Matriculation Day—Freshman Class
Sept. 19	Monday	Registration Day—Upper Classes
Sept. 20	Tuesday	Recitations begin at 8 A. M.
Sept. 22	Thursday	University Day—Afternoon holiday
Sept. 28	Wednesday	Meeting of University Senate at 4:15 P.M.
Oct. 8	Saturday	Dads' Day
Oct. 21	Friday	Annual Meeting of Board of Trustees
Nov. 10	Thursday	Mid-Semester reports to be filed, 5 P.M.
Nov. 12	Saturday	Homecoming Day
Nov. 23	Wednesday	Thanksgiving Recess—Wed., 12.30 P.M. to Mon., 8 A.M.
Dec. 17	Saturday	Christmas Recess begins at 12:30 P.M.

1939

Jan. 3	Tuesday	Christmas Recess ends at 8 A.M.
Jan. 20	Friday	Meeting of Board of Trustees
Jan. 18-27	Wed.-Fri.	First Semester examinations

## SECOND SEMESTER

Jan. 30	Monday	Registration Day—All Classes
Jan. 31	Tuesday	Recitations begin at 8 A.M.
Feb.	Friday	Winter Carnival, Fri., 12.30 P.M., to Sat., 12:30 P.M.

## UNIVERSITY OF NEW HAMPSHIRE

Feb. 8	Wednesday	Meeting of University Senate at 4:15 P.M.
Mar. 25	Saturday	Spring Recess begins at 12:30 P.M.
Apr. 3	Monday	Spring Recess ends at 8 A.M.
Apr. 13	Thursday	Mid-Semester reports to be filed, 5 P.M.
Apr. 21	Friday	Meeting of Board of Trustees
May 20	Saturday	Mothers' Day
May 29- June 8	Tues.-Thurs.	Second Semester examinations
May 30	Tuesday	Memorial Day—Holiday
June 9	Friday	Meeting of University Senate at 4:15 P.M.
June 10	Saturday	Alumni Day-Meeting of Board of Trustees
June 11	Sunday	Baccalaureate Exercises
June 12	Monday	Class Day Exercises at 10:00 A.M. Commencement at 3:00 P.M.

## SUMMER SESSION

1939

June 26	Monday	Registration Day
June 27	Tuesday	Classes begin at 8 A.M.
Aug. 4	Friday	Summer Session closes at 4 P.M.

## BOARD OF TRUSTEES

HIS EXCELLENCY, GOVERNOR FRANCIS P. MURPHY, LL.D., *ex officio*

PRESIDENT FRED ENGELHARDT, A.M., PH.D., *ex officio*

ANDREW L. FELKER, Commissioner of Agriculture, *ex officio*

ROY D. HUNTER, LL.D., *President* West Claremont  
June 14, 1916 to June 30, 1941

HARRY D. SAWYER Woodstock  
September 15, 1926 to June 30, 1938

JAMES A. WELLMAN, B.S. Manchester  
January 26, 1928 to June 30, 1939

ROBERT T. KINGSBURY Keene  
January 27, 1928 to June 30, 1940

#\*CHARLES H. HOOD, B.S., D.S.C. Boston, Massachusetts  
May 6, 1929 to June 30, 1939

GEORGE T. HUGHES, A.M., LL.D. Dover  
July 1, 1931 to June 30, 1939

\*JOHN S. ELLIOTT, B.S., *Secretary* Madbury  
July 1, 1932 to June 30, 1940

JESSIE DOE Rollinsford  
July 1, 1932 to June 30, 1938

JOHN T. DALLAS, A.B., D.D., LL.D. Concord  
July 1, 1933 to June 30, 1941

FRANK W. RANDALL, B.S. Portsmouth  
July 1, 1936 to June 30, 1940

\*ROHL C. WIGGIN, B.A. Newton Centre, Massachusetts  
January 21, 1938 to June 30, 1939

\*Elected by Alumni

#Died November 22, 1937

## OFFICERS OF ADMINISTRATION

FRED ENGELHARDT, PH.D., *President of the University*  
HERMON L. SLOBIN, PH.D., *Dean of the Graduate School*  
NORMAN ALEXANDER, PH.D., *Dean of Men*  
RUTH J. WOODRUFF, PH.D., *Dean of Women*  
OREN V. HENDERSON, *Registrar*  
RAYMOND C. MAGRATH, *Treasurer and Business Secretary*  
EDWARD Y. BLEWETT, B.A., *Assistant to the President*  
MARVIN A. MILLER, B.A., B.S., *Librarian*

## THE GRADUATE COUNCIL

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GEORGE W. CASE, M.C.E., *Dean of the College of Technology*  
M. GALE EASTMAN, PH.D., *Dean of the College of Agriculture*  
C. FLOYD JACKSON, B.A., M.S., *Dean of the College of Liberal Arts*  
JOHN C. KENDALL, B.S., *Director of the Agricultural Experiment Station and Extension Service*  
WALTER C. O'KANE, M.A., D.SC., *Professor of Entomology*  
ALFRED E. RICHARDS, PH.D., *Secretary*

## THE GRADUATE FACULTY

### PROFESSORS

C. FLOYD JACKSON, B.A., M.S., *Zoölogy*  
WALTER C. O'KANE, M.A., D.SC., *Entomology*  
ALFRED E. RICHARDS, PH.D., *English*  
ORMOND R. BUTLER, PH.D., *Botany*  
HERMON L. SLOBIN, PH.D., *Mathematics*  
HARRY W. SMITH, A.M., *Economics*  
LEON W. HITCHCOCK, B.S., *Electrical Engineering*  
GEORGE F. POTTER, PH.D., *Horticulture*  
THOMAS G. PHILLIPS, PH.D., *Agricultural and Biological Chemistry*  
DONALD C. BABCOCK, S.T.B., M.A., *History*  
GEORGE W. CASE, M.C.E., *Mechanical Engineering*  
HERBERT F. RUDD, PH.D., *Philosophy*  
HAROLD H. SCUDDER, B.S., *English*  
HAROLD A. IDDLIS, PH.D., *Chemistry*  
EDMOND W. BOWLER, S.B. in S.E., *Civil Engineering*  
CLIFFORD S. PARKER, PH.D., *Languages*  
A. MONROE STOWE, PH.D., *Education*  
CHARLES W. COULTER, PH.D., *Sociology*  
THORSTEN V. KALIJARVI, PH.D., *Political Science*

### ASSOCIATE PROFESSORS

JOHN S. WALSH, A.M., *Languages*  
WILLIAM G. HENNESSY, A.M., *English*  
ADOLPH G. EKDAHL, PH.D., *Psychology*



## GRADUATE SCHOOL

HARLAN M. BISBEE, A.M., *Education*  
J. RAYMOND HEPLER, M.S., *Horticulture*  
WALTER E. WILBUR, M.S., *Mathematics*  
GEORGE W. WHITE, PH.D., *Geology*  
RUSSELL R. SKELTON, B.S. IN C.E., C.E., *Civil Engineering*  
HEMAN C. FOGG, PH.D., *Chemistry*

## ASSISTANT PROFESSORS

EDWARD T. DONOVAN, B.S., *Mechanical Engineering*  
ARTHUR W. JONES, M.A., *History*  
MARIAN F. MILLS, M.A., *Botany*  
STANLEY R. SHIMER, M.S., *Agricultural and Biological Chemistry*  
L. PHELPS LATIMER, PH.D., *Horticulture*  
EDYTHE T. RICHARDSON, M.S., *Zoölogy*  
ALLAN B. PARTRIDGE, M.A., *History*  
PHILIP M. MARSTON, M.A., *History*  
MARVIN R. SOLT, M.S., *Mathematics*  
WILLIAM B. NULSEN, M.S., *Electrical Engineering*  
PAUL P. GRIGAUT, CERT. SORBONNE, DIPL. ECOLE DU LOUVRE, *Languages*  
JAMES A. FUNKHOUSER, PH.D., *Chemistry*  
CARROLL S. TOWLE, B.A., PH.D., *English*  
MARGARET R. HOBAN, BS., in ed., *Physical Education, (Education)*  
MILTIADES S. DEMOS, PH.D., *Mathematics*  
CHARLES M. MASON, PH.D., *Chemistry*  
GIBSON R. JOHNSON, PH.D., *History*  
CLAIR W. SWONGER, A.M., *Economics*  
WILLIAM YALE, PH.B., M.A., *History*  
THEODORE R. MEYERS, M.A., *Geology*  
CARL LUNDHOLM, B.S., *Physical Education*  
DONALD H. CHAPMAN, PH.D., *Geology*  
ALBERT F. DAGGETT, PH.D., *Chemistry*  
LLOYD C. FOGG, PH.D., *Zoölogy*  
EARL E. HOOVER, B.S., *Zoölogy*

## INSTRUCTORS

STUART DUNN, PH.D., *Botany*  
JOHN A. FLOYD, A.B., *Languages*  
RUTH E. THOMPSON, M.S., *Zoölogy*  
JAMES G. CONKLIN, M.S., *Entomology*  
LAWRENCE W. SLANETZ, PH.D., *Bacteriology (Botany)*  
WILLIAM R. EADIE, M.S., *Zoölogy*  
ELEANOR L. SHEEHAN, M.S., *Zoölogy*  
JAMES T. SCHOOLCRAFT, JR., A.M., *Languages*  
JOSEPH E. BATCHELDER, JR., B.A., *Sociology*  
ALBERT F. BUFFINGTON, PH.D., *Languages*  
ROBERT H. GRANT, A.B., *English-Education (Education)*

# THE GRADUATE SCHOOL

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## AIMS

The Graduate school meets the needs of superior students who are preparing to become teachers in colleges or universities, or investigators; and offers opportunities to qualified students for a more advanced training than they can obtain through an undergraduate curriculum.

## ADMINISTRATION

Graduate work is offered, under the supervision of the dean of the Graduate school, by members of various university departments of instruction and research who constitute the faculty of the Graduate school.

The general administrative functions of the faculty are delegated to the dean and the committee on graduate study.

## ADMISSION

A student who holds a bachelor's degree, or its equivalent, from an approved college or university, is eligible for admission to graduate study.

Admission to graduate study does not necessarily imply admission to candidacy for an advanced degree. Students who are not planning to become candidates for an advanced degree may be admitted to graduate study upon the recommendation of the heads of the departments concerned, and with the approval of the dean.

A student may major only in the departments represented in the catalog of the Graduate school.

## TUITION AND FEES

Tuition is \$150 for residents of New Hampshire and \$250 for non-residents. Tuition is paid in advance in two equal installments, one on the first day of each semester.

## GRADUATE SCHOOL

A diploma fee of \$5.00 is charged upon graduation. Charges will be assessed for extraordinary breakage or damage. No laboratory or course fees are charged. Payment of the full tuition fee entitles the student to admission to all varsity athletic games and contests.

Members of the regular university staff and their immediate families electing work in the Graduate school shall be required to pay \$2.60 a credit for eight or less credits.

Members of the university staff who are employed on a fiscal year basis, who may register in the Summer school, are required to pay \$2.60 a credit with the further proviso that the general Summer school registration fee of \$10 for residents of New Hampshire shall not be charged.

Residents of New Hampshire, not members of the university staff or of their immediate families, who elect less than eight credits in the Graduate school will be expected to pay a registration fee of \$1.00 and a charge of \$5.25 for each credit.

Non-residents of New Hampshire, registering in the Graduate school for less than 8 credits shall be required to pay a registration fee of \$2.00 and tuition at the rate of \$10.50 a credit.

### HONORARY FELLOWSHIPS FOR VISITING SCHOLARS

Professors or other eminent scholars who may desire temporarily the privileges of the library and the research facilities of the university, and who are not candidates for a degree, may, upon recommendation of the dean of the Graduate school and the approval of the president of the university, be appointed honorary fellows without stipend. Honorary fellows shall not be required to pay any charges except, possibly the cost of unusually expensive supplies or equipment.

### ASSISTANTSHIPS AND SCHOLARSHIPS

Graduate assistantships, which usually require half-time service at a stated salary, are available in a number of departments. Graduate assistants pay tuition in accordance with the regulation pertaining to the members of the university staff. The residence requirement for a master's degree for holders of these appointments is not less than two years.

## UNIVERSITY OF NEW HAMPSHIRE

A limited number of superior students are awarded exemption from tuition. These awards are subject to the maintenance of a high scholarship record in the Graduate school and may be revoked by the committee on exemption of tuition at the end of any semester, if, in their judgment, the student does not merit such exemption for the subsequent semester.

Inquiries regarding these assistantships and scholarships should be addressed to the head of the department concerned.

### SUPPLIES

Books, drawing instruments, materials, etc., may be purchased at the university bookstore in Thompson hall.

### ROOMS

Because of the congestion of undergraduate students in the dormitories of the university, it is impossible to guarantee reservation of rooms to graduate students. Rooms may be secured in private houses at prices from \$85 to \$150 a year.

Women students, unless living at home, are required to room in the women's dormitories, or in approved houses. A competent matron is in charge of each women's dormitory.

### BOARD

The university operates on a self-service basis a modern, well-appointed commons. Both regular weekly board and cafeteria service are provided. Exact cost records are kept, and prices are adjusted in such a manner as to give students the advantage of changing costs.

### REGISTRATION

A student desiring to register for graduate study must submit to the dean of the Graduate school the official application for admission to graduate study. Blanks for this purpose may be obtained from the dean of the Graduate school.

Upon admission to graduate work, a student first pays his fee at the business office and deposits his enrollment cards with the registrar.

## GRADUATE SCHOOL

### REQUIREMENTS FOR GRADUATE CREDIT

Graduate credit will not be allowed to undergraduate students unless such credit has been approved in advance by the dean of the Graduate school.

A student will not receive graduate credit for a course in which he has obtained a grade lower than 70.

### ADVANCED DEGREES

The advanced degrees conferred are: Master of science, master of arts, master of education, master of civil engineering, master of electrical engineering, and master of mechanical engineering.

### REQUIREMENTS FOR THE MASTER'S DEGREE

**RESIDENCE.**—A minimum of one full academic year, or four summer sessions of six weeks each, at the University of New Hampshire, or three summer sessions of eight weeks each, at the Isles of Shoals, in residence is required.

**CREDITS.**—An average grade of at least 80 in not less than 30 credits is required. These credits must be in courses numbered 50 or over (and in thesis, if required) and must be in the major and allied departments as prescribed by the head of the major department and approved by the dean of the Graduate school. Of the total credits required for an advanced degree, not more than 6 semester credits may be transferred from another institution.

Students who transfer the total of 6 credits from another institution may complete the residence requirement at the university in 3 summer sessions.

In general all graduate work must be completed within a period of not more than eight (8) years.

**THESIS.**—If a thesis is required, the candidate must file with the committee on graduate study, for its approval, a statement of the thesis subject as recommended by the head of the department in which the thesis work has been done, at least six months previous to the time the degree is sought.

## UNIVERSITY OF NEW HAMPSHIRE

All theses must be typewritten upon standard paper, eight and one-half by eleven inches, medium weight, neatly bound in black cloth, and gilt-lettered on the first cover with the title, name of author, degree sought, and year of graduation. The title page should bear the following statement:

"A thesis submitted to the University of New Hampshire in partial fulfillment of the requirements for the degree of

master of arts in (name of major subject)  
master of science in (name of major subject)  
master of education  
master of civil engineering  
master of electrical engineering  
master of mechanical engineering."

Whenever a thesis is printed in any periodical, it must be designated as having been accepted as a master's thesis by the University of New Hampshire.

Two bound copies must be filed before commencement day, one with the librarian and one with the head of the department in which the major work has been done.

EXAMINATIONS.—All candidates must meet the regular departmental requirements as to examinations in the courses for which they are registered, and the requirement of a special comprehensive examination, by the heads of the departments in which the major and allied courses have been taken, three months previous to the time the degree is sought. In addition, the candidate must pass an oral examination by a special committee designated by the committee on graduate study and including the heads of the departments in which the major and allied courses have been taken, before the candidate may be recommended for the master's degree. At least two months previous to the time the degree is sought the candidate must file with the dean of the Graduate school the "application for examination for advanced degree". The application forms may be obtained at the office of the dean of the Graduate school.



## DESCRIPTION OF COURSES

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Courses numbered 51-100 are open to advanced undergraduates and graduate students. Courses numbered 101-200 are open to graduate students only. For other courses that may be approved for graduate credit see the general catalog.

### AGRICULTURAL AND BIOLOGICAL CHEMISTRY

THOMAS G. PHILLIPS, *Professor*; STANLEY R. SHIMER, *Assistant-Professor*

Students majoring in this department are expected to have had preparation in the biological sciences, in physics and in general, analytical and organic chemistry. Physical chemistry and a reading knowledge of German or French are desirable. The library and equipment of the Experiment station are available for the use of graduate students.

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

51, 52. **PHYSIOLOGICAL CHEMISTRY.** The chemistry of fats, carbohydrates and proteins, colloids, enzyme action, digestion, metabolism and excretion. The qualitative and quantitative examination of blood and urine. Mr. Shimer.

Prereq.: Satisfactory preparation in organic chemistry and quantitative analysis. 3 rec.; 2 lab.; 5 cr.

53, 54. **AGRICULTURAL ANALYSIS.** A study of the methods of analysis of soils, fertilizers, feeding stuffs, and other products important in agriculture. Mr. Phillips and Mr. Shimer.

Prereq.: Satisfactory preparation in organic chemistry and quantitative analysis. 1 rec.; 3 lab.; 4 cr.

55. **PLANT CHEMISTRY.** A study of the chemistry of plant growth and of methods for the analysis of plant materials. Mr. Phillips.

Prereq.: Agricultural chemistry 2. 2 rec.; 2 lab.; 4 cr.

# UNIVERSITY OF NEW HAMPSHIRE

## COURSES PRIMARILY FOR GRADUATE STUDENTS

101, 102. **ADVANCED BIOCHEMISTRY.** The preparation, composition and analysis of carbohydrates, fats and proteins. Discussions and laboratory. Mr. Phillips and Mr. Shimer.

4 cr. each.

103, 104. **SPECIAL PROBLEMS.** Conferences and library and laboratory work on special phases of chemistry in its relation to agriculture and biology. Mr. Phillips and Mr. Shimer.

Subject matter and credits to be arranged.

## *BOTANY AND BACTERIOLOGY*

ORMOND R. BUTLER, *Professor*; MARIAN E. MILLS, *Assistant Professor*; STUART DUNN, *Instructor*; LAWRENCE W. SLANETZ, *Instructor*.

53, 54. **ADVANCED BOTANY.** The subject matter will depend upon the training and desire of the student. Cannot be elected without previous consultation. Mr. Butler, Miss Mills, Mr. Dunn and Mr. Slanetz.

Credits to be arranged.

55, 56. **ADVANCED BACTERIOLOGY.** The subject matter will depend upon the training and desire of the student. This course cannot be elected without previous consultation with the instructor, Mr. Slanetz.

Credits to be arranged.

101. **MORPHOLOGY OF THE ALGAE.** Study of the habits, structure, life histories and relationships of the various groups of the algae. Miss Mills.

Lab. and assigned reading; 4 cr. Given in alternate years with 102.



## GRADUATE SCHOOL

102. MORPHOLOGY OF THE BRYOPHYTES AND PTERIDOPHYTES. Study of the vegetative and reproductive organs, life histories and relationships of the liverworts, mosses, ferns and fern allies. Miss Mills.

Lab. and assigned reading; 4 cr.

103. MORPHOLOGY OF THE SPERMATOPHYTA. Study of the vegetative organs, vascular anatomy, the flower, fertilization, the embryo and phylogeny of the higher plants. Miss Mills.

Lab. and assigned reading; 4 cr.

104. SYSTEMATIC BOTANY. A study of the higher plants of our native flora. The student is required to prepare an herbarium of 90 plants. Miss Mills.

Prereq.: Botany 1, 2. Conferences, field and laboratory work; 4 cr.

105. PLANT PHYSIOLOGY. Absorption, conduction, transpiration and excretion of water, and effect of environmental factors upon these phenomena; mineral nutrition; carbon and nitrogen assimilation. Mr. Dunn.

Prereq.: Botany 4. Lab. and assigned reading; 5 cr.

106. PLANT PHYSIOLOGY. Digestion of carbohydrates, fats and proteids, respiration and fermentation; effect of external conditions on growth, paratonic and autonomous movements. Mr. Dunn.

Prereq.: Botany 4. Lab. and assigned reading; 5 cr.

107. PLANT HISTOLOGY. General morphology of the tissue systems; the primary tegumentary tissue; the fundamental tissue system, the vascular tissue system, development of secondary members, formation of secondary tissue. Mr. Butler.

Prereq.: Botany 3. Lab. and assigned reading; 5 cr.

108. DISEASES OF TREE AND BUSH FRUITS. The bacterial and fungous diseases of fruits, their symptoms, cause and prevention. Mr. Dunn.

## UNIVERSITY OF NEW HAMPSHIRE

Prereq.: Botany 5. Lab. and assigned reading; 3 cr.  
Given in alternate years with 109.

109. DISEASES OF FARM CROPS. The bacterial and fungous diseases of vegetables, their symptoms, cause and prevention. Mr. Dunn.

Prereq.: Botany 5. Lab. and assigned reading; 3 cr.  
Given in alternate years with 108.

110. FUNGICIDES. Preparation and use of fungicides and a study of their effect upon the higher plants and parasitic organisms. Mr. Butler.

Prereq.: Botany 5. Lab. and assigned reading; 4 cr.

### CHEMISTRY

HAROLD A. IDDLES, *Professor*; HEMAN C. FOGG, *Associate Professor*; JAMES A. FUNKHOUSER, *Assistant Professor*; CHARLES M. MASON, *Assisant Professor*; ALBERT F. DAGGETT, *Assistant Professor*.

Graduate study in chemistry is open to those who have completed the chemistry curriculum of either the college of liberal arts or the college of technology, or some similar course of study. Excellent opportunities are offered for research in general and analytical chemistry, organic chemistry and physical chemistry.

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

53, 54. ORGANIC CHEMISTRY. The lectures consider the chief divisions of organic chemistry, aliphatic and aromatic. These are considered with the needs of the pre-professional student in mind and are followed by a more detailed consideration of carbohydrates and proteins. The laboratory course is designed to develop the technique of organic chemical methods as illustrated in the preparation and purification of typical organic compounds. Mr. Funkhouser.

Prereq.: Inorganic and analytical chemistry. 3 rec.;  
2 lab; 5 cr. May be taken for graduate credit by non-majors in chemistry.

## GRADUATE SCHOOL

55, 56. THEORETICAL PROBLEMS OF MODERN ORGANIC CHEMISTRY. A consideration of the principles underlying the behavior of organic compounds, and the problems awaiting solution. The first semester includes such topics as free radicals, the nature of organic linkages, unsaturated compounds including conjugated systems, polymerization and tautomerism. The first portion of the second semester is devoted to a discussion of cyclic compounds and the benzene problem; the major portion to stereochemistry, including stereoisomerism, ring formation, and steric hindrance.

Prereq.: Elementary organic chemistry. 3 rec.; 3 cr.

61, 62. INTRODUCTORY THEORETICAL CHEMISTRY. The lectures of this course deal with the structure and properties of matter as developed from studies of radioactivity, atomic structure, crystal structure, etc. With these as a foundation the course develops the relations between elements as they occur in the periodic arrangement. Werner's theory of complex compounds is considered at the close of the year. An effort is made to develop the historical background of all these topics as they are discussed. Mr. Funkhouser.

Prereq.: Inorganic and analytical chemistry. 2 rec.; 2 cr.

83, 84. PHYSICAL CHEMISTRY. This course will include a study of the properties of gases, liquids and solids. The principles of thermodynamics will be presented and their applications discussed. These will be used as a basis for the study of solutions, ionic theory, chemical equilibria, thermochemistry, conductance, and electromotive force. The principles of kinetics will be presented and their application to reaction rates discussed in detail. The laboratory will include accurate measurements illustrating the principles studied in the lectures. Mr. Mason.

Prereq.: Chemistry 32, mathematics, 8 physics 8. 3 rec.;  
— 2 lab.; 5 cr.

\*CHEMISTRY-EDUCATION (CH-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL CHEMISTRY. Open to seniors and graduate students

## UNIVERSITY OF NEW HAMPSHIRE

who have had two years of college chemistry and have satisfactorily completed Education 61, 141-a, 142-b, or 40 c. Required of students who desire to do supervised teaching in chemistry.

3 rec.; 3 cr.

### COURSES PRIMARILY FOR GRADUATE STUDENTS

101. ADVANCED QUANTITATIVE ANALYSIS. Physico-Chemical Methods. The lectures discuss analytical procedures involving nephelometry, colorimetry, electrometric titrations, etc. The subjects of buffers, methods of determining pH, use and theory of electrodes for E.M.F. measurements, and electrolytic separations by controlled electrode potential and internal electrolysis are studied. Assigned readings are made in recent publications concerning these and other analytical topics. Mr. Fogg.

Prereq.: Elementary quantitative analysis. 2 rec.; 2 cr.

102. HISTORY OF CHEMISTRY. A course tracing the growth of chemistry, particularly theories of the science in an historical manner. The course also endeavors to give an insight into the personalities of famous chemists and lays some stress on the better known contemporary chemists and their work. Mr. Funkhouser.

Prereq.: Acceptable courses in organic chemistry. 2 rec.; 2 cr.

111. ORGANIC CHEMISTRY. The chemistry of the polynuclear compounds and heterocyclic systems. Mr. Iddles.

3 rec.; 3 cr.

115. ORGANIC CHEMISTRY LABORATORY. QUALITATIVE ANALYSIS. The reactions and properties of organic compounds. Use of group reactions in the identification of organic substances. Mr. Iddles.

1 rec.; 2 lab.; 3 cr.

\* Not offered in 1938-39.

## GRADUATE SCHOOL

116. ORGANIC CHEMISTRY LABORATORY. QUANTITATIVE ANALYSIS. The combustion for carbon and hydrogen, Dumas nitrogen, Kjeldahl nitrogen, estimation of halogens, of sulphur and of organic radicals. The work will include some micro-determinations. Mr. Iddles.

1 rec.; 2 lab.; 3 cr.

121. PHYSICAL CHEMISTRY. CHEMICAL THERMODYNAMICS. The application of thermodynamics to chemistry. The principles of thermodynamics will be thoroughly reviewed. These principles will be applied in detail to the phase rule, chemical equilibrium, electromotive force, theory of solutions, specific heats and similar topics. Mr. Mason.

Prereq.: One year of physical chemistry. 3 rec.; 3 cr.

122. PHYSICAL CHEMISTRY. CHEMICAL KINETICS. A study of the kinetics of homogeneous and heterogeneous reactions in gaseous and liquid systems, including an introduction to photochemistry. Mr. Daggett.

Prereq.: One year of physical chemistry. 3 rec.; 3 cr.

131, 132. COLLOQUIUM IN ORGANIC CHEMISTRY. The lectures will consider a special field of organic chemistry and will be varied from semester to semester. Mr. Iddles and Mr. Funkhouser.

1 Lec.; 2 cr.

133, 134. COLLOQUIUM IN PHYSICAL CHEMISTRY. The lectures will consider a special field of physical chemistry and will be varied from semester to semester. Mr. Mason and Mr. Daggett.

1 Lec.; 2 cr.

136. COLLOQUIUM ANALYTICAL CHEMISTRY AND RARE EARTHS. The lectures will consider recent topics in analytical chemistry and developments in the field of rare earths. Mr. Fogg.

1 Lec.; 2 cr.

## UNIVERSITY OF NEW HAMPSHIRE

141, 142. SEMINAR. Presentation and discussion of recent investigations in the field of chemistry.

No credit.

151, 152. RESEARCH FOR THE MASTER'S DEGREE.

Credit arranged.

### EDUCATION

A. MONROE STOWE, *Professor*; HARLAN M. BISBEE, *Associate Professor*.

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WALTER E. WILBUR, *Associate Professor (Mathematics-Education)*

MARGARET R. HOBAN, *Assistant Professor (Physical Education)*

CARL LUNDHOLM, *Assistant Professor (Physical Education)* JOHN

A. FLOYD, *Instructor (Language-Education)* ROBERT H. GRANT, *Instructor (English-Education)*.

The graduate work of students in education is designed to supplement their undergraduate studies in such ways as to prepare them most effectively for the professions of secondary-school teaching or public school administration.

For admission to candidacy for a master's degree in education, a student must present, in addition to a bachelor's degree, evidence of having satisfactorily completed (a) the course in psychological principles of secondary education or its equivalent, (b) eighteen semester credits in a teaching major subject, (c) twelve semester credits in a first teaching minor subject, and (d) six semester credits in a second teaching minor subject.

Candidates for the master's degree in education must submit evidence of having satisfactorily completed the following courses in education or their equivalents either as undergraduate or graduate students:

Education 51, 52 Social Principles of Secondary education, 6 cr.

Education 61 Principles and Problems of Teaching in the secondary schools, 3 cr.



## GRADUATE SCHOOL

Either

Education 71, 72 History of Civilization and Education, 6 cr.

or

Education 75 Democracy in Education and Character development, 3 cr.

and

Education 76 Philosophy of Education, 3 cr.

-Education 91 A course in problems in the teaching of the major subject, 3 cr.

-Education 91 A course in problems in the teaching of a minor subject, 3 cr.

The candidate must also present either evidence of having taught successfully for three or more years or, in lieu of such successful teaching, evidence of having satisfactorily completed one semester of supervised teaching, Education 94. Graduate students successfully completing Education-94 with a grade of at least 75 will receive nine semester credits toward the master's degree. In the case of such students it will ordinarily require at least an academic year and a summer school session in which to meet the requirements of the master's degree in education.

51, 52. SOCIAL PRINCIPLES OF SECONDARY EDUCATION. This course in educational sociology and secondary education is devoted to a consideration of the educationally significant aspects and needs of our modern democratic society and to a study of the organization, functions, curricula and outstanding problems of our American institutions of secondary education. Mr. Stowe.

Open to students who have satisfactorily completed 41, 42. Required of students completing the University Teacher Training curriculum. 3 rec.; 3 cr. (Not open to students who have credit for 21-a, 38-a, and 39-b, or 131-a, 132-b, 133-c)

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61, (61). PRINCIPLES AND PROBLEMS OF TEACHING IN THE SECONDARY SCHOOL. This course is devoted to a study of the following aspects of teaching in secondary schools:

- (1) Secondary school objectives and the objectives in the teaching of secondary school subjects.
- (2) Principles of teaching and of directing learning incorporated in teaching which meets the needs of high school students and attains the objectives of the secondary school.
- (3) Secondary school tests and the ways in which teachers are endeavoring to ascertain the extent to which their objectives are being attained.
- (4) Class management, the purpose of which is to insure conditions favorable to the attainment of the objectives of the secondary school. Mr. Bisbee.

Open to students who have satisfactorily completed 121-a, 122-b, 123-c, or 41, 42. Required of students completing the University Teacher Training curriculum. 3 rec.; 3 cr. (Not open to students who have credit for 23-c, 40-c, and 141, 142)

### 71, 72. HISTORY OF CIVILIZATION AND EDUCATION.

Offered in 1938-39 as History 53-54.

75. DEMOCRACY IN EDUCATION AND CHARACTER DEVELOPMENT. In this course there will be discussed student participation in high school control; social functions; the underlying principles of club work; the problem of character education, and the moral standards in our high schools as revealed by investigations. Mr. Bisbee.

Open to seniors who have satisfactorily completed 121-a, 122-b, 123-c, or 41, 42. 3 rec.; 3 cr. (Not open to students who have credit for 52-a or 149-a)



## GRADUATE SCHOOL

76. PHILOSOPHY OF EDUCATION. A consideration of the fundamental concepts and ultimate objectives of education, current educational doctrines and controversies, changes in educational procedures, historic background and philosophical implications. Mr. Bisbee.

Open to students who have satisfactorily completed 121-a, 122-b, 123-c, 131-a, 132-b, 133-c, or 41, 42 and 51-52. 3 rec.; 3 cr. (Not open to students who have credit for 47-c, or 147-c.)

\*101. PRINCIPLES AND PROBLEMS OF PUBLIC SCHOOL ADMINISTRATION.

3 cr. Not open to students who have credit for Education 151, 152.

\*111. PRINCIPLES AND PROBLEMS OF HIGH SCHOOL ADMINISTRATION.

3 cr. Not open to students who have credit for Education 153, 154.

\*\*121. PRINCIPLES AND PROBLEMS OF HIGH SCHOOL SUPERVISION.

3 cr. Not open to students who have credit for Education 155, 156.

\*\*131, 132. SEMINAR IN EDUCATIONAL PROBLEMS. The problems to be studied will depend upon the interests of the students enrolled in the seminar. Mr. Stowe.

Open to seniors and graduate students majoring in education. Credits to be arranged. (A substitute for Education 55-a, 56-b, 57-c and Education 157-a, 158-b and 159-c)

### \*COURSES IN THE TEACHING OF HIGH SCHOOL SUBJECTS

The following three-semester-credit courses are devoted to a study of problems of objectives, selection and organization of subject-mat-

\* Not offered in 1938-39 but offered in the 1938 Summer School.

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ter, teaching and testing techniques and classroom management in the teaching of the respective subjects.\* Students desiring to do supervised teaching must complete with a grade of at least 75 one of these courses in the subject in which he hopes to do supervised teaching.

\*\*\*BIOLOGY-EDUCATION (BI-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL BIOLOGY.

\*\*CHEMISTRY-EDUCATION (CH-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL CHEMISTRY.

ENGLISH-EDUCATION (ENG-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL ENGLISH. Mr. Grant.

FRENCH-EDUCATION (FR-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL FRENCH. Mr. Floyd.

HISTORY-EDUCATION (HIST-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL HISTORY.

HISTORY-EDUCATION (HIST-Ed) 92. PRACTICUM IN THE TEACHING OF HIGH-SCHOOL HISTORY.

MATHEMATICS-EDUCATION (MATH-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL MATHEMATICS. Mr. Wilbur.

PHYSICAL EDUCATION (P-E) 91, 92. PROBLEMS IN THE TEACHING OF PHYSICAL-EDUCATION. Miss Hoban.

\*\*PHYSICS-EDUCATION (PH-Ed) 91. PROBLEMS IN THE TEACHING OF HIGH-SCHOOL PHYSICS.

### SUPERVISED TEACHING

In this work the student participates in the conduct of class exercises and in the control of the classroom, at first chiefly as an observer, but gradually entering into teacher responsibilities until complete charge of the classroom is secured.

This work is required in the University Teacher Preparation curriculum. It is open only to students whose applications are approved

\*For details concerning prerequisites and nature of these courses, see description given under respective subject-matter departments.

\*\*Not offered in 1938-39.

\*\*\*Not offered in 1938-39, but is offered in Summer School at Isles of Shoals.

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by the professor of education acting as director of student teaching and the supervisor of student teaching in the subject or subjects in which the applicant desires to do supervised teaching. Applications should be filed in the office of the professor of education in October of the academic year in which the supervised teaching is to be done. No applications will be considered unless the applicant has completed with a grade of at least 75 the following courses in Education: 41, 42, or 121-a, 122-b, and 123-c, 51-52, 121-a, 132-b, 133-c, and 61, or 141-a, 142-b, and, with an average grade of 75 or better, at least 18 credits in the subject-matter field in which he desires to teach under supervision. The applicant must also complete with a grade of at least 75 a course in the problems of teaching the subject in which he desires to do supervised teaching.

EDUCATION-BIOLOGY (Bi-Ed) 94. SUPERVISED TEACHING IN HIGH SCHOOL BIOLOGY.

EDUCATION-CHEMISTRY (Ed-CHEM) 94. SUPERVISED TEACHING IN HIGH SCHOOL CHEMISTRY.

EDUCATION-CIVICS (Ed-Civ) 94. SUPERVISED TEACHING IN HIGH SCHOOL CIVICS.

EDUCATION-COMMERCIAL SUBJECTS (Ed-CS) 94. SUPERVISED TEACHING IN HIGH SCHOOL COMMERCIAL SUBJECTS.

EDUCATION-ECONOMICS (Ed-ECON) 94. SUPERVISED TEACHING IN HIGH SCHOOL ECONOMICS.

EDUCATION-ENGLISH (Ed-ENG) 94. SUPERVISED TEACHING IN HIGH SCHOOL ENGLISH.

EDUCATION-FRENCH (Ed-Fr) 94. SUPERVISED TEACHING IN HIGH SCHOOL FRENCH.

EDUCATION-HISTORY (Ed-Hist) 94. SUPERVISED TEACHING IN HIGH SCHOOL HISTORY.

EDUCATION-LATIN (Ed-LAT) 94. SUPERVISED TEACHING IN HIGH SCHOOL LATIN.

EDUCATION-MATHEMATICS (Ed-MATH) 94. SUPERVISED TEACHING IN HIGH SCHOOL MATHEMATICS.

EDUCATION-PHYSICAL EDUCATION (Ed-PE) 93 (93) DIRECTED TEACHING IN PHYSICAL EDUCATION IN THE UNIVERSITY.

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EDUCATION-PHYSICAL EDUCATION (ED-PE) 94. SUPERVISED TEACHING IN HIGH SCHOOL PHYSICAL EDUCATION.

EDUCATION-PHYSICS (ED-PH) 94. SUPERVISED TEACHING IN HIGH SCHOOL PHYSICS.

EDUCATION-SOCIOLOGY (ED-SOC) 94. SUPERVISED TEACHING IN HIGH SCHOOL SOCIOLOGY.

ZOOLOGY-EDUCATION (ZOO-ED) 93, 94. SUPERVISED TEACHING IN ZOOLOGY.

### EDUCATION

161, 162. AMERICAN COLLEGE AND UNIVERSITY EDUCATION—PRINCIPLES AND PROBLEMS. This course is devoted to a comparative and historical study of American college and university education. Among the topics studied are the following: A liberal education in democracy, American colleges as agencies of American democracy, purposes and objectives in American collegiate education, academic college admission and degree requirements, American college curricular problems including curricular provisions for junior college and senior college years, selecting college students, educational and vocational guidance needed by college students, student activities, educational activities under the direction of college teachers and college teaching and testing technics, college teaching as a profession in America, professional preparation for successful college teaching, and college and university administrative problems of interest to college teachers.

Assigned readings, class discussions, tests, and term papers embodying results of individual studies of problems investigated by members of the class.

Open to graduate assistants, to assistants and members of the instructional staff of the university, and to graduate students planning to teach in the college or university field. 1 rec.; 2 cr.

SATURDAY COURSES. Certain Saturday courses described in the undergraduate catalog may be taken for graduate credit.

## GRADUATE SCHOOL

### ENGINEERING

GEORGE W. CASE, *Professor*; LEON W. HITCHCOCK, *Professor*; EDMOND W. BOWLER, *Professor*; RUSSELL R. SKELTON, *Associate Professor*; EDWARD T. DONOVAN, *Assistant Professor*; WILLIAM B. NULSEN, *Assistant Professor*.

Graduate work is offered in civil, electrical, and mechanical engineering leading to the degrees of master of civil engineering, master of electrical engineering, and master of mechanical engineering, respectively. A thesis of professional character and ten semester credits of course work, a major part of which has a bearing on the thesis subject, constitutes the requirement for the degree.

The following courses, which require as prerequisites the completion of undergraduate work in these fields, are available to candidates and may have their content changed to meet the requirements of the theses which they are designed to serve.

Civil engineering 51, 52—Hydraulic engineering

Civil engineering 61, 62—Highway engineering

Electrical engineering 51, 52—Distribution and Industrial problems

Electrical engineering 61, 62—Electrical circuit theory

Mechanical engineering 51, 52—Thermodynamics

Mechanical engineering 61, 62—Engineering economy

### ENGLISH

ALFRED E. RICHARDS, *Professor*; HAROLD H. SCUDDER, *Professor*; WILLIAM G. HENNESSY, *Associate Professor*; PAUL S. SCHOEDINGER, *Assistant Professor*; CARROLL S. TOWLE, *Assistant Professor*; ROBERT H. GRANT, *Instructor*.

The candidate for an advanced degree who elects English as his major subject must have a reading knowledge of French and German, or of Latin and German.

## UNIVERSITY OF NEW HAMPSHIRE

### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

52. INSTRUCTION TO DRAMA. This course is a comprehensive survey of dramatic literature from the Greek drama to the present. Mr. Hennessy.

3 rec.; 3 cr. (Given in alternate years; not offered 1938-39)

53, 54. SHAKESPEARE'S PLAYS. This course comprises a study of the major histories, comedies, and tragedies. Shakespeare is interpreted as poet and dramatist. Mr. Hennessy.

3 rec.; 3 cr.

55. MILTON. A detailed study of Milton's minor poetry and the *Paradise Lost*. Consideration is also given to the social, political, and religious history of Milton's day. Mr. Scudder.

3 rec.; 3 cr. (Given in alternate years; not offered 1938-39)

57. THE ENGLISH NOVEL IN THE EIGHTEENTH CENTURY. The novel from Defoe through the Gothic romance. There will be lectures and constant reading. Mr. Schoedinger.

3 rec.; 3 cr. (Given in alternate years; not offered 1938-39)

59. THE ENGLISH NOVEL OF THE NINETEENTH CENTURY. A study of the novel from Jane Austen to Thomas Hardy. Mr. Scudder.

3 rec.; 3 cr.

61, 62. THE ENGLISH ROMANTIC WRITERS. A course dealing with the major writers of the early nineteenth century, such as Wordsworth, Coleridge, Byron, Lamb, Shelley, Hazlitt, and Keats. One hour of the week will be devoted to round-table discussion with small groups. Mr. Towle.

3 rec.; 3 cr.



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63, 64. ADVANCED AMERICAN LITERATURE. A series of studies in special fields, the subjects to be announced. In 1938-39 the subjects are: the American poetry of the nineteenth century, and the New England renaissance. Mr. Scudder.

3 rec.; 3 cr.

65, 66. WRITING AS AN ART. A course in the study and practice of writing through an examination of the history of literary criticism. The reading of famous critical essays and of many contemporary opinions, correlated with practice writing of various types. Each student is allowed to spend much of his time with the type he finds most congenial. Collateral reading, with frequent class discussions and conferences. Mr. Towle.

Prereq.: an advanced course in English composition.

3 rec.; 3 cr. (Given in alternate years; not offered 1938-39)

67, 68. CHAUCER. A study of Chaucer's life and times, and a reading of his principal works. In the first semester, lectures upon Old and Middle English grammar are given, and a few of the minor poems are read. In the second semester, *Troilus* and *Cressida* and most of the *Canterbury Tales* are studied. Mr. Richards.

3 rec.; 3 cr.

ENGLISH-EDUCATION (ENG-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL ENGLISH. This course deals specifically with the selection and organization of subject-matter, with the most efficient methods of presenting this material, and with the problems which arise within the wide field of the teaching of high school English. Mr. Grant.

Prereq.: three years of English courses. Required of students majoring in English who plan to teach English in secondary schools. Elective for students majoring in language, history, or education. 2 lec.; 1 lab.; 3 cr.

## UNIVERSITY OF NEW HAMPSHIRE

### COURSES PRIMARILY FOR GRADUATE STUDENTS

101, 102. COLLATERAL READING. A study, in translation, or selections from the great writers of literature. In the first semester special attention is given to Dante's *Divine Comedy*; in the second, to Cervante's *Don Quixote* and to Goethe's *Faust*. Lectures, recitations, and written reports. Mr. Richards.

3 rec.; 4 cr.

103, 104. THE FAUST STORY. A study of the Faust legend as it is found in the literature of Germany and of England. Special attention is given to Marlowe's drama and to the later forms of the legend in English literature. Mr. Richards.

3 rec.; 3 cr. (Given in alternate years; not offered 1938-39)

105, 106. SPENSER AND HIS TIMES. A study of the life and works of Edmund Spenser as they mirror the development of English poetry and history in the sixteenth century. Mr. Richards.

3 rec.; 4 cr.

### ENTOMOLOGY

WALTER C. O'KANE, *Professor*; JAMES G. CONKLIN, *Instructor*.

The aim of graduate study in this department is to prepare a student for professional work in one or more of the several specialized divisions of economic entomology. Such preparation requires more time and effort than represented by the four years of undergraduate college work. It assumes that in his undergraduate studies the student has laid a groundwork of general entomology and appropriate related sciences.

The student who wishes to enter graduate work will be expected to present such a foundation, its details depending on the phase of professional entomology in which the student desires to specialize. Related sciences presented may include courses in zoölogy, chemistry,



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botany, plant pathology, bacteriology, horticulture, or physics, in various combinations. Consultation with the head of the department of entomology will determine the prerequisites necessary in a given case.

### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

Under suitable circumstances graduate credit may be obtained for the following courses, which are open to undergraduates, provided the permission of the head of the department of Entomology is secured, and provided that the graduate student completes additional work in these courses and attains superior grades.

52. INSECTS OF ORCHARD AND GARDEN. The application of methods of insect control to typical injurious species. Studies of the life histories and habits of important insect pests of orchards, garden, and certain field crops. Mr. O'Kane.

Prereq.: Entomology 1. 2 rec.; 1 lab.; 2 cr. (Given in alternate years; offered in 1937-38)

53. INSECTS OF DOMESTIC ANIMALS. The insect enemies of domestic livestock; their life histories, habits, and means of control. Mr. O'Kane.

Prereq.: Entomology 1. 2 rec.; 1 lab.; 2 cr. (Given in alternate years; offered in 1936-37)

54. HOUSEHOLD INSECTS. MEDICAL ENTOMOLOGY. The life histories, habits, and means of control of insects of the household and of stored products. The relation of insects to disease. Mr. O'Kane.

2 rec.; 1 lab.; 2 cr.

56. FOREST INSECTS. Studies of the life histories and habits of the more destructive forest insects and means of their control. Mr. O'Kane.

2 rec.; 1 lab.; 2 cr.

57. ADVANCED ENTOMOLOGY. Studies of the external morphology

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of insects, with special reference to the structures used in classification. Mr. O'Kane and Mr. Conklin.

Required of students specializing in entomology. 2 rec.;  
2 lab.; 4 cr.

58. ADVANCED ENTOMOLOGY. Studies of the internal anatomy and physiology of insects. Mr. O'Kane and Mr. Conklin.

Prereq.: Entomology 57. Required of students specializing in entomology. 2 rec.; 2 lab.; 4 cr.

59, 60. ADVANCED ECONOMIC ENTOMOLOGY. Detailed studies of problems involved in applied entomology. The literature of economic entomology. Investigational methods. Practice in arranging projects. Studies of the specialized phases of entomology. Mr. O'Kane and Mr. Conklin.

Open to students only by permission of head of department. Required of students specializing in entomology.  
Hours and credits to be arranged.

### COURSES PRIMARILY FOR GRADUATE STUDENTS

The following courses represent a sequence of studies arranged to include such branches as insect anatomy, insect physiology, details of taxonomy, insect behavior, insect ecology, problems of dispersion, the organization of research, the organization of regulatory measures, and other phases involved in professional entomology. The sequence includes, also, the planning and prosecution of a problem in research, with presentation of the results in the form of a thesis.

101, 102. GRADUATE ENTOMOLOGY. Mr. O'Kane and Mr. Conklin.  
Prereq.: Entomology 57 to 60, or the equivalent.  
Hours and credits to be arranged.

103, 104. GRADUATE ENTOMOLOGY. Mr. O'Kane and Mr. Conklin.  
Prereq.: Entomology 57 to 60, or the equivalent.  
Hours and credits to be arranged.

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### GEOLOGY

GEORGE W. WHITE, *Associate Professor*; THEODORE R. MEYERS, *Assisant Professor*; DONALD H. CHAPMAN, *Assistant Professor*.

Students majoring in this department are expected to have had preparation in physical geology, historical geology, structural geology, mineralogy, and chemistry. Students expecting to work mainly in physical geology should have had additional training in chemistry and physics; those expecting to work mainly in historical geology should have had additional training in zoölogy.

Southern New Hampshire presents many attractive geologic problems, especially in the fields of physiography, glacial geology, and metamorphic and igneous geology.

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

51, 52. MINERALOGY. A study of crystals followed by a study of minerals and mineral determination by means of physical characteristics. Mr. White.

2 rec.; 1 lab.; 3 cr. Does not carry graduate credit for undergraduates majoring in geology.

53, 54. ECONOMIC GEOLOGY. A study of metal ores, coal, and petroleum; and the structures and geologic setting in which each occurs. Mr. Meyers.

3 rec.; 3 cr. (Given in alternate years; offered in 1938-39)

55, 56. PALEONTOLOGY. A study of animal fossils, both invertebrate and vertebrate, and of plant fossils. Chief emphasis is given to invertebrate forms.

2 rec.; 1 lab.; 3 cr. (Given in alternate years; not offered in 1938-39)

57, 58. GEOLOGIC PROBLEMS. A study of special problems by means of conferences, reading, and field work. Mr. White, Mr. Meyers, and Mr. Chapman.

Hours and credits to be arranged.

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### COURSES PRIMARILY FOR GRADUATE STUDENTS

101, 102. GLACIAL GEOLOGY. A detailed study of glacial geology, principally of North America, with special emphasis on New England. Mr. White, and Mr. Chapman.

Prereq.: Courses in physical geology and physiography. 2 rec.; 2 lab. or equivalent time in field work; 4 cr.

103, 104. OPTICAL CRYSTALLOGRAPHY AND PETROGRAPHY. A study of minerals and rocks in powder and in thin sections by means of the petrographic microscope. Mr. Meyers.

Prereq.: Courses in mineralogy and physics. 1 rec.; 2 lab.; 3 cr.

105, 106. RESEARCH. Work on special problems.

Geomorphology—Mr. White.

Glacial Geology—Mr. White and Mr. Chapman.

Areal Geology and Petrography—Mr. Meyers.

Prereq.: Special permission. Credits to be arranged.

### HISTORY

DONALD C. BABCOCK, *Professor*; GIBSON R. JOHNSON, *Assistant Professor*; ARTHUR W. JONES, *Assistant Professor*; ALLAN B. PARTRIDGE, *Assistant Professor*; PHILIP M. MARSTON, *Assistant Professor*; WILLIAM YALE, *Assistant Professor*.

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A. MONROE STOWE, *Professor*; (*History-Education*)

### ADMISSION TO GRADUATE STUDY.

1. The completion of 18 credits, or the equivalent thereof, in history, exclusive of History 1, 2, and with an average grade of 75 or better.

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2. The understanding that the earning of graduate credit implies
  - (a) A passing grade of 85 in courses taken in the same class with undergraduates.
  - (b) A passing grade of 80 in other courses.
  - (c) An additional 20% of work to be done as an extra assignment in classes with undergraduates.
  - (d) A willingness and a desire to do more than the required minimum, especially as regards collateral reading.

### ADMISSION TO CANDIDACY.

1. Reading knowledge of a foreign language.
2. A comprehensive examination in the field of general history.
3. Favorable judgment of the head of the department as well as of the dean of the Graduate school.

OBJECTIVES. In general, two classes of graduate students may find it profitable to do their major work in this department. The first consists of students who desire a more extended knowledge and a more complete historical background to round out a liberal education, and perhaps to prepare them for the teaching of history. The second consists of those who wish to specialize on some phase of New England history, preferably that of New Hampshire.

PLAN OF WORK; GENERAL COURSE. Graduate students in this department will, at the discretion of the head of the department, include in their programs, after admission to candidacy, course 101, History survey. At some later period they will include 102, History reading and theory. Those not specializing in New England history will complete their major work from courses listed in the general catalog. As a rule, a thesis will be written.

SPECIAL COURSE. Students specializing in the history of New England will be expected to choose as a subject for the thesis some topic within this field. For this purpose the available facilities for research

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are considerable, including the libraries of this and other universities, the state library and the library of the Historical society in Concord, and various town records, private documents, unrecorded personal memoirs, landmarks, etc. A part of the work of this department is conceived to be the discovery and conservation of source material existing in the material and mental accumulations of the older type of New England population.

Courses 107-108 inclusive are designed for students of New Hampshire history. These courses are not given in class work, and only students especially well prepared will be permitted to follow this line of work.

### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS.

53, 54. **THE HISTORY OF CIVILIZATION.** This course is designed to show the close connection between the historical development of western society in both Europe and North America and their educational institutions. It traces the early development of educational institutions in the ancient Orient, Greece and Rome through the dark and middle ages down to modern times. It connects the development of modern educational systems in Europe and the United States with nineteenth and twentieth century developments. Mr. Yale.

Elective for Seniors. 3 lec. or rec.; 3 cr.

55, 56. **THE INTERPRETATION OF HISTORY.** An investigation of some of the ways in which thoughtful persons have viewed the historic process as a whole. The aim is the interpretation of life; the method is to combine philosophy, sociology, and history, with emphasis on the latter. Mr. Babcock.

Required of students majoring in History. 3 lec. or discussions; 3 cr.

57, 58. **HISTORIOGRAPHY.** A study of the lives and writings of some of the leading historians from earliest times to the present, with the motive of learning what their contributions were to the scope, method, viewpoint, and literary achievement in the historical field. Mr. Partridge.

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Required of students majoring in History. 3 lec.; or  
rec.; 3 cr. (Not offered in 1938-39)

59, 60. SOCIAL AND CULTURAL HISTORY OF NEW ENGLAND. This course covers the period from the settlements to the present. The material and intellectual aspects peculiar to New England's social and cultural life will be emphasized. It is assumed that the student is familiar with the general history of New England. Mr. Marston.

Prereq.: 59 prereq. for 60. Elective for juniors and seniors who have taken, or are taking 5, 6, or 7, 8.  
3 lec. or rec.; 3 cr.

61, 62. THE WORLD WAR. A study of the causes of the World War, of the military, political, and economic developments during the course of the war, and of the Paris peace conference. Mr. Yale.

Elective for juniors and seniors, by permission of the instructor. 3 lec. or rec.; 3 cr.

63, 64. RECENT WORLD HISTORY. A study of the post-war world, with special emphasis of the historical developments in Europe, the Near East, and the Far East. Mr. Yale.

Elective for juniors and seniors, by permission of the instructor. 3 lec. or rec.; 3 cr.

HISTORY-EDUCATION (HIST-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL HISTORY. This course includes a study of the purposes and objectives of teaching high school history, of the selection and organization of teaching material, and of teaching and testing techniques which may be advantageously used in teaching high school history. The course will include experiments in studying and teaching recent American history. Mr. Stowe.

Open to students who have satisfactorily completed History 7, 8, Political Science 1, 2, Economics 1, 2 or 3, 4, and Education 61. 3 lec. 3 cr.



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HISTORY-EDUCATION (HIST-ED) 92. PRACTICUM IN THE TEACHING OF HISTORY IN HIGH SCHOOLS. The purpose is to aid teachers of world history, ancient, early European, and modern history. The difficulties and values of such courses will be appraised. How can subject matter be selected and organized, considering the pupil's age and attainment level, to clarify factors and forces and processes of mankind in the past that make the present world more understandable? Consideration will be given to objectives, curriculum variations, methods of presentation, reading and activity programs, testing, the teaching of current events, and such other problems as are raised by members of the class. The vision, the challenge, and the ideals of social studies instruction will be balanced by the reality of developing teachable units for classroom use. Individual guidance will be given members of the class as they work on their own special problems.

1 rec.; 2 cr.

### COURSES PRIMARILY FOR GRADUATE STUDENTS.

- 101. Historic survey.
- 102. Historic reading and theory.
- 107, 108. New Hampshire history.
- 110, 111. Thesis.

## HORTICULTURE

GEORGE F. POTTER, *Professor*; J. RAYMOND HEPLER, *Associate Professor*; L. PHELPS LATIMER, *Assistant Professor*.

Graduate work in horticulture is offered to students who desire training for professional work, and who have fulfilled the requirements for undergraduate students majoring in horticulture at this or a similar institution. A reading knowledge of French and German is desirable. The student should also have had sufficient practical experience to enable him to understand and appreciate the problems of horticulture.

Students will find the department well equipped for fundamental research on horticultural problems.



## GRADUATE SCHOOL

### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

54. **ADVANCED POMOLOGY.** A detailed study of fundamental principles and experimental data and their application and relation to orchard problems such as growth and rest period in fruit plants, water requirements, soil management, pruning, fruit bud formation, fruit setting, pollination, thinning, and winter injury.

2 rec.; 2 cr.

55. **SYSTEMATIC SURVEY OF FRUITS.** A study of the more important species of fruits and their botanical relationships.

2 rec.; 2 cr.

65. **COMMERCIAL VEGETABLE GARDENING.** The management of commercial vegetable gardens with special attention to the botanical relationships of the principal species of plants cultivated as vegetables.

2 rec.; 1 lab.; 3 cr.

91, 92. **HORTICULTURAL SEMINAR.** A review of the recent horticultural literature and methods of investigational work.

2 rec.; 2 cr.

94. **EVOLUTION AND IMPROVEMENT OF PLANTS.** The application of the principles of genetics to agricultural plant breeding. Hybridization and selection are studied as means of improving horticultural varieties of plants.

Prereq.: Zoölogy 49. 2 res.; 2 cr. (Given in alternate years; offered in 1938-39)

95, 96. **SPECIAL PROBLEMS.** Subject-matter to meet the needs of special students, or groups of students may be taken by arrangement with the head of the department.

Hours and credits to be arranged.

# UNIVERSITY OF NEW HAMPSHIRE

## COURSES PRIMARILY FOR GRADUATE STUDENTS

101. FLOWER BUD FORMATION. A discussion of scientific and experimental evidence bearing on flower formation, growth, and composition of fruit plants, alternate bearing of apples, and soil management and fertilization of orchards.

2 rec.; 3 cr.

102. METHODS OF HORTICULTURAL RESEARCH. An examination of methods used in laboratory and field by horticultural investigators.

2 rec.; 2 cr.

103. WINTER INJURY. The physiology of winter injury to fruit plants.

2 rec.; 3 cr.

105. PROPAGATION AND GROWTH. The problems of water relations, rest period, propagation, pruning and thinning of orchard fruits.

2 rec.; 3 cr.

106. POLLINATION AND FRUIT STORAGE. The experimental evidence dealing with pollination, fruit setting, color development, and storage of fruits.

2 rec.; 2 cr.

108. VEGETABLE PROBLEMS. A critical study of the physiological problems involved in vegetable production.

2 rec.; 3 cr.

125, 126. RESEARCH IN HORTICULTURE.

Credits to be arranged.

127, 128. THESIS.

## GRADUATE SCHOOL

### LANGUAGES

CLIFFORD S. PARKER, *Professor*; JOHN S. WALSH, *Associate Professor*; PAUL P. GRIGAUT, *Assistant Professor*; JAMES T. SCHOOLCRAFT, JR., *Instructor*; ALBERT F. BUFFINGTON, *Instructor*; JOHN A. FLOYD, *Instructor*.

To pursue graduate work in French, an applicant, if a graduate of the University of New Hampshire, must have passed 18 credits of undergraduate work in French, and must have demonstrated his fitness for work in the graduate courses offered by this department. If a graduate of another institution, an applicant must show by his record and by his knowledge of French that he is prepared to undertake the work.

#### FRENCH

##### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

53, 54. FRENCH ROMANTICISM. This course, covering the period from the year 1750 to 1850, will begin with a study of J. J. Rousseau's work and influence, continue with the important writers of the romantic school in the 19th century, and analyze the intermingling of romanticism and realism in the work of Balzac. Mr. Parker.

Prereq.: French 12. 3 rec.; 3 cr.

57, 58. FRENCH LITERATURE FROM 1850 TO THE PRESENT. This course will study realism and naturalism in the novel and drama, the Parnassian and symbolist schools in poetry, the psychological novels of Bourget, and the various schools and trends of the late 19th and early 20th centuries. Conducted largely in French. Mr. Grigaut.

Prereq.: French 52, 54, or 64. 3 rec.; 3 cr.

61, 62. FRENCH GRAMMAR. This course, intended primarily for those who intend to teach French, will be devoted to a systematic study of French grammar in all its phases from elementary to highly advanced. Mr. Floyd.

Prereq.: Permission of the instructor or of the head of the department. Permission will be granted only to juniors, seniors, and graduate students. 3 rec.; 3 cr.

## UNIVERSITY OF NEW HAMPSHIRE

63, 64. FRENCH LITERATURE AND CIVILIZATION OF THE MIDDLE AGES AND THE RENAISSANCE. A study of the various forms and masterpieces of French literature from the beginning to the year 1600, with consideration of their historical and social background. Lectures, extensive reading, reports, and recitations. Recommended for seniors and graduate students. Mr. Parker.

Prereq.: French 12 or 54. 2 rec.; 2 cr.

67, 68. SURVEY OF MODERN EUROPEAN LITERATURE. The Renaissance, classicism, romanticism, and realism will be studied in this course as international movements. Stress will be laid, not upon the details of each national literature, but upon the interdependence of the literatures of the various countries. Literature will be interpreted also as a product of changing patterns of civilization and social ideas. The required reading may be done in the original language or in translations. Conducted in English. Mr. Grigaut.

Prereq.: Junior, senior, or graduate standing. 3 rec.; 3 cr. (Given in alternate years; offered in 1938-39).

71, 72. STUDIES IN MODERN FRENCH LITERATURE. This course will take up several of the greatest French writers from 1600 to 1900 for a detailed and comprehensive study of their work. The choice of writers to be studied in a given year will depend upon the needs or tastes of the students electing the course. The work will be conducted largely in French. Mr. Grigaut.

Prereq.: Senior or graduate standing. 3 rec.; 3 cr. (Given in alternate years; not offered in 1938-1939.)

FRENCH-EDUCATION (FR-ED) 91. PROBLEMS IN THE TEACHING OF FRENCH IN THE HIGH SCHOOL. This course will study the special objectives, methods, and problems of high school French. It is open only to Seniors and to graduate students who are planning to teach. Visits to schools to observe the work of experienced teachers will be arranged. Students in this course may be given an opportunity to assist in the work of French 1, 2. Mr. Floyd.

Prereq.: Permission of the head of the department. 3 rec.; 3 cr.

## GRADUATE SCHOOL

### COURSES FOR GRADUATE STUDENTS ONLY

101, 102. STUDIES IN FRENCH LITERATURE OF THE MIDDLE AGES AND THE RENAISSANCE. A seminar course which will take up several of the greatest French writers of the periods indicated, such as Chretien de Troyes, Villon, Rabelais, Ronsard, and Montaigne, for a detailed and comprehensive study of their work. Mr. Parker.

3 rec.; 3 cr. (Given only when there is sufficient demand.)

107, 108. FOREIGN INFLUENCE ON FRENCH LITERATURE. A study of the influences of other countries upon French literature from the middle ages to the 19th century. Conducted largely in French. Mr. Grigaut.

3 rec.; 3 cr. (Given only when there is sufficient demand.)

### GERMAN

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

53, 54. GERMAN ROMANTICISM. Lectures, interpretations, collateral reading, and reports. The lectures in this course trace the revival of the historical and imaginative middle ages in the first half of the nineteenth century. Mr. Schoolcraft.

Prereq.: Two years of college German or the equivalent.

3 lec.; 3 cr. (Given in alternate years; offered in 1938-1939)

57, 58. MODERN GERMAN LITERATURE. Lectures, interpretations, collateral reading, and reports. The purpose of the lectures in this course is to trace the development of German literature from 1832 to the present, with special emphasis on the novel and drama. Among the authors considered are Grillparzer, Hebbel, Ludwig, Keller, Meyer, Wagner, Hauptmann, Sudermann, Thomas Mann, Rilke, George, and Schnitzler. Mr. Buffington.

Prereq.: Two years of college German or the equivalent. 3 lec.; 3 cr. (Given in alternate years; offered in 1938-1939.)

## UNIVERSITY OF NEW HAMPSHIRE

63, 64. HISTORY OF GERMAN LITERATURE. Lectures, interpretations, and collateral reading. The lectures in this course trace the development of the literature from pagan to modern times. Representative works are read both in and out of class. The history of German civilization is taken up with the history of literature. Mr. Schoolcraft.

Prereq.; Three years of college German or the equivalent. 3 lec.; 3 cr. (Given in alternate years; not offered in 1938-1939.)

### LATIN

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

In order that graduate students may minor in Latin, the department offers each year two courses carrying graduate credit for approved students.

51, 52. PHILOSOPHY AND SATIRE. Particular attention will be paid to the study of the philosophy, religion, natural science and social theories of the Romans, as exemplified in the writings of Horace, Martial, and Cicero. Mr. Walsh.

Prereq.: Latin 8. 3 rec.; 3 cr. (Given in alternate years; not offered in 1938-39.)

55, 56. LITERATURE AND HISTORY. This course offers a comprehensive view of Latin literature of the golden age. The works of Caesar, Cicero, and Virgil will be analyzed for their literary value and historical content. The history of Rome during the golden age will be studied in order to provide the background necessary to the student or teacher of the classics. Mr. Walsh.

Prereq.: Latin 8. 3 rec.; 3 cr. (Given in alternate years; offered in 1938-39.)

63, 64. LATIN COMPOSITION AND TEACHING METHODS. Translation of English narrative, beginning with the fundamentals of

## GRADUATE SCHOOL

grammar and progressing to a study of prose style and effective idiomatic expression. Discussion of the best methods of presenting material to a class. Mr. Walsh.

Prereq.: Permission of instructor or of head of department. 3 rec.; 3 cr.

### MATHEMATICS

HERMON L. SLOBIN, *Professor*; WALTER E. WILBUR, *Associate Professor*; \*MARVIN R. SOLT, *Assistant Professor*; MILTIADES S. DEMOS, *Assistant Professor*.

#### COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

51, 52. ADVANCED CALCULUS, DIFFERENTIAL EQUATIONS, VECTOR ANALYSIS AND THEIR APPLICATIONS TO ENGINEERING PROBLEMS. Mr. Solt.

Prereq.: Mathematics 8. 3 rec.; 3 cr.

55, 56. ADVANCED PLANE AND SOLID ANALYTICAL GEOMETRY. Mr. Solt.

Prereq.: Mathematics 8. 3 rec.; 3 cr. (Given in alternate years; not offered in 1938-39)

57. THE HISTORY OF MATHEMATICS. This course is designed especially for those preparing to teach mathematics in the high schools. It aims to give an historical background and an appreciation of the development of various fields of mathematics. Mr. Wilbur.

Prereq.: Mathematics 4 or 7. 3 rec.; 3 cr. (Given in alternate years; offered in 1938-39)

61, 62. SEQUENCES AND SERIES. An introduction to advanced analysis. Mr. Slobin.

Prereq.: Mathematics 8. 3 rec.; 3 cr.

\*Leave of Absence 1938-39



## UNIVERSITY OF NEW HAMPSHIRE

71, 72. ADVANCED ALGEBRA. The following topics will be treated in this course: matrix theory, including elementary divisors and invariant factors; linear transformations; quadratic, bilinear and Hermitian forms; invariants and covariants with geometric applications; and topics from the theory of equations, including symmetric functions, and groups of substitutions. Mr. Demos.

Prereq.: Mathematics 8. 3 rec.; 3 cr. (Given in alternate years; offered in 1938-39)

MATHEMATICS-EDUCATION (MATH-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL MATHEMATICS. A study of the aims and values of secondary school mathematics, the recommendations of the national committee on mathematics requirements, and the state board requirements; also a study of the subject-matter and the sequence in which it should be presented in both junior and senior high schools, and the various techniques used in teaching secondary school mathematics. Errors, testing program and remedial teaching will be included. Lectures, assigned readings and discussion. Mr. Wilbur.

Prereq.: Mathematics 8 or 34 and 4. Students preparing to teach mathematics in high school should register for this course. 3 rec.; 3 cr.

### COURSES PRIMARILY FOR GRADUATE STUDENTS

101. SELECTED TOPICS IN THE THEORY OF FUNCTIONS OF A REAL VARIABLE. Mr. Slobin.

Prereq.: Mathematics 8. 3 rec.; 3 cr.

102. SELECTED TOPICS IN THE THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. Mr. Demos.

Prereq.: Mathematics 8. 3 rec.; 3 cr.

### SOCIAL STUDIES

HARRY W. SMITH, *Professor of Economics*; HERBERT F. RUDD, *Professor of Philosophy*; CHARLES W. COULTER, *Professor of Soci-*

## GRADUATE SCHOOL

ology; THORSTEN V. KALIJARVI, *Professor of Political Science*; ADOLPH G. EKDAHL, *Associate Professor of Psychology*; CLAIR W. SWONGER, *Assistant Professor of Economics*; JOSEPH E. BATCHELDER, *Instructor of Sociology*.

The close relationship of the subject matter of the various departments hereunder included make it advantageous to a strong program of graduate study to group the work under the heading of *Social Studies*. Important problems do not of necessity follow departmental lines. A student may wish to study governmental control of business, which takes him into the departments of economics and politics. Another may pursue a problem of ethical development, which will take him into philosophy, psychology, and sociology. Coöperation among allied departments offers decided advantages both in breadth and thoroughness of training. The courses offered below make it possible for the student to concentrate in one or two fields, while at the same time they present him with the opportunity of gaining a broad training in human relations. A student who majors in this work will receive the degree of master of arts in social studies.

While it is impossible to set up precise qualifications for entering upon work in the field of social studies, general standards must be met by the candidate. He should have substantial beginning equivalent to an undergraduate major in some one or a combination of social subjects, or else be prepared at the recommendation of the committee of the social studies to take basic elementary undergraduate courses without credit. He should also satisfactorily demonstrate to the committee that he has a definite purpose in undertaking graduate work. He will be required to take as a minimum one year's work in each of three of the social sciences and submit a satisfactory thesis forty days prior to graduation.

### ECONOMICS

#### 51. LABOR PROBLEMS.

3 cr.

#### 52. PUBLIC FINANCE.

3 cr.

## UNIVERSITY OF NEW HAMPSHIRE

53, 54. MONEY AND BANKING.

3 cr.

55, 56. CORPORATIONS.

3 cr.

57, 58. HISTORY OF ECONOMICS.

3 cr.

59, 60. SEMINAR IN CURRENT ECONOMIC PROBLEMS.

3 cr.

### *PHILOSOPHY*

81. MAJOR MOVEMENTS IN EUROPEAN PHILOSOPHY.

3 cr.

82. MAJOR SYSTEMS AND PROBLEMS OF CURRENT PHILOSOPHY.

3 cr.

83. THE EVOLUTION OF SOCIAL VALUES AND ETHICAL JUDGMENTS.

3 cr.

84. ETHICAL PROBLEMS OF TODAY.

3 cr.

87, 88. SEMINAR: SPECIAL PROBLEMS IN PHILOSOPHY.

Credit to be arranged.

### *POLITICAL SCIENCE*

51. CONSTITUTIONAL LAW.

3 cr.

52. JURISPRUDENCE.

3 cr.

53, 54. POLITICAL THEORY.

3 cr.

55, 56. INTERNATIONAL RELATIONS AND WORLD GOVERNMENT.

3 cr.

58. PUBLIC ADMINISTRATION.

3 cr.

## GRADUATE SCHOOL

### PSYCHOLOGY

62. MENTAL HYGIENE.  
3 cr.
68. SYSTEMATIC PSYCHOLOGY.  
3 cr.
- 71, 72. SEMINAR.  
3 cr.

### SOCIOLOGY

71. CRIME AND ITS SOCIAL TREATMENT.  
3 cr.
72. THE FAMILY.  
3 cr.
75. METHODS OF SOCIAL RESEARCH.  
3 cr.
76. PRINCIPLES OF SOCIAL CASE WORK.  
3 cr.
84. METHODS OF SOCIAL PROGRESS.  
3 cr.
- 89, 90. DEVELOPMENT OF SOCIOLOGICAL THOUGHT.  
3 cr.
- 95, 96. SOCIOLOGICAL RESEARCH.  
3 cr.

### ZOOLOGY

C. FLOYD JACKSON, *Professor*; EDYTHE T. RICHARDSON, *Assistant Professor*; LLOYD C. FOGG, *Assistant Professor*; EARL E. HOOVER, *Assistant Professor*; RUTH E. THOMPSON, *Instructor*; W. ROBERT, EADIE, *Instructor*; ELEANOR L. SHEEHAN, *Instructor*.

COURSES FOR ADVANCED UNDERGRADUATE AND GRADUATE STUDENTS

- 51, 52. INVERTEBRATE ZOÖLOGY. A study of the structure, habits,

## UNIVERSITY OF NEW HAMPSHIRE

and ecological relationships of the different groups of invertebrate animals. Miss Sheehan.

Given at the Isles of Shoals marine laboratory during the summer session.

53, 54. HISTOLOGY. A study of microscopical anatomy. Mr. Fogg.

Prereq.: Two years' work in zoölogy and permission of the instructor. 3 rec.; 1 lab.; 4 cr.

55, 56. EMBRYOLOGY. The study of type forms illustrating the fundamental principles of the embryonic development of animals. Mr. Fogg.

Prereq.: Three years' work in zoölogy and permission of the instructor. 3 rec.; 1 lab.; 4 cr.

57, 58. LABORATORY TECHNIQUE. A laboratory course in the methods used in the preparation of zoölogical material, microscope slides, mounting embryos, making serial sections, etc. Will be adapted to individual needs as far as possible. Mr. Fogg.

Prereq.: A course in history, cytology, neurology, embryology, or any of these courses carried as parallel work, and permission of the instructor. 1 rec.; 2 lab.; 3 cr.

59, 60. ADVANCED PHYSIOLOGY. An advanced study of human physiology with special emphasis on nutrition, circulation, respiration, excretion, and secretion. The work will consist of lectures, assigned readings and laboratory experiments. Mrs. Richardson.

Prereq.: Two years' work in zoölogy. 3 rec.; 1 lab.; 4 cr.

61, 62. CYTOLOGY AND GENETICS. A detailed study of the cell, including morphology, the chemical and physical nature of protoplasm, mitosis, meiosis, syngamy, and related phenomena leading up to the physical basis of inheritance and the study of Mendel's laws, the expression and interaction of the genes, linkage, sex and its in-

## GRADUATE SCHOOL

heritance, the inheritance of quantitative characters, and the types and causes of variations. Mrs. Richardson.

Prereq.: Two years' work in zoölogy. 3 rec.; 1 lab.; 4 cr. (Given in alternate years; offered in 1938-39)

63, 64. NEUROLOGY. A comparative study of the nervous system of the lower animals and a detailed study of the morphology, physiology, and histology of the human nervous system. The subject is intended to give a practical knowledge of the nervous system and its operation. Mrs. Richardson.

Prereq.: Two years' work in zoölogy. 3 rec.; 1 lab.; 4 cr. (Given in alternate years; not offered in 1938-39)

BIOLOGY-EDUCATION (BIOL-ED) 91. PROBLEMS IN THE TEACHING OF HIGH SCHOOL BIOLOGY. Materials and methods in presenting the subject of biology in secondary schools and introductory college courses will be discussed. There will also be a general survey of the field of biology for the purpose of correlating the various lines of work previously studied.

Given at the Isles of Shoals marine laboratory during the summer session.

ZOÖLOGY-EDUCATION (ZOO-ED) 93, 94. SUPERVISED TEACHING IN ZOÖLOGY. Qualified students will be allowed to teach under supervision in the freshman laboratory. The course will include a review of general zoölogy and will be an introduction to teaching for zoölogy students. Students planning to teach biology should supplement this course with similar work in the department of botany. Students who desire to take supervised teaching in high schools may elect 94 as 6 credits under the usual regulations of the department of education. Miss Sheehan.

Prereq.: Senior standing and the permission of the instructor. 1 lec. or rec.; 1 or 2 lab.; 2 or 3 cr.

95, 96. PROBLEMS OF CONSERVATION RESEARCH. A problems course open to advanced students or students who show unusual promise in the field of research. Problems will be available in all

## UNIVERSITY OF NEW HAMPSHIRE

phases of conservation work and specifically in applied chemistry, zoölogy, ecology, genetics, limnology and silviculture. The nature of the problems will be determined by the need of the New Hampshire fish and game department for research in various fields and the background and interests of individual students. Mr. Hoover.

Prereq.: Permission of the instructor. 1 conference,  
2 lab. periods; 4 cr.

97, 98. SPECIAL PROBLEMS AND SEMINAR. Advanced students may elect this work provided they present a detailed outline of the problems which they wish to investigate and, furthermore, provided they can furnish adequate proof of their ability to carry the problem in view of their past training and the equipment available. Mr. Fogg and Mr. Hoover.

Credits to be arranged.

### COURSES PRIMARILY FOR GRADUATE STUDENTS

101, 102. ADVANCED TAXONOMY. Critical examination of selected groups of vertebrates and invertebrates with special reference to local forms, their classification, distribution, and phylogeny. Mr. Jackson.

Prereq.: Three years' work in zoölogy. 2 rec.; 2 lab.;  
4 cr.

103, 104. ADVANCED VERTEBRATE ECOLOGY. A study of advanced ecological problems and their correlation with morphology, physiology, and taxonomy as exemplified by local associations and cenoses. Mr. Jackson.

Prereq.: Three years' work in zoölogy. 2 rec.; 2 lab.;  
4 cr.

105, 106. ADVANCED EXPERIMENTAL BIOLOGY. An application of the experimental method as applied to vertebrate and invertebrate forms. Mr. Fogg and Mr. Hoover.

Prereq.: Three years' work in zoölogy. Time and hours  
to be arranged; 4 cr.



# UNIVERSITY OF NEW HAMPSHIRE

## GRADUATE STUDENTS

NAME	COURSE	P.O. ADDRESS
Bailey, Walter H. A.B., Harvard University, 1937	<i>Major Chemistry</i>	<i>Durham</i>
Blickle, Robert L. B.S., Ohio State University, 1937	<i>Major Entomology</i>	<i>Ironton, Ohio</i>
Breon, Willard Stover B.S., Penn. State, 1937	<i>Major Agr. Chemistry</i>	<i>State College, Pa.</i>
Clapp, James Wellington B.S., Mass. State, 1936	<i>Major Chemistry</i>	<i>Springfield, Mass.</i>
Clark, Robert Irving B.A., Bowdoin, 1929	<i>Major English</i>	<i>Derry Village</i>
Conroy, John Joseph B.A., New Hampshire, 1932	<i>Major Soc. Studies</i>	<i>Durham</i>
Couture, Philip Gignac B.S., New Hampshire, 1936	<i>Major Entomology</i>	<i>Laconia</i>
Cowden, Herbert Baylay B.S., New Hampshire, 1936	<i>Major Chemistry</i>	<i>Durham</i>
Delpino, Ruth C. A.B., Bates College, 1929	<i>Major Soc. Studies</i>	<i>New Castle</i>
Downey, Paul Milton B.S., Worcester Polytechnic Institute, 1936	<i>Major Chemistry</i>	<i>Nashua</i>
Gillette, Willard Raymor B.S., Mass. State, 1936	<i>Major Botany</i>	<i>Durham</i>
Grasso, Salvatore B.S., New Hampshire, 1937	<i>Major Civil Engineering</i>	<i>Milford</i>
Hammett, Walter Henry B.A., Yale University, 1932	<i>Major Soc. Studies</i>	<i>Durham</i>
Harding, Stanley Lauriston B.S., New Hampshire, 1935	<i>Major Education</i>	<i>Farmington</i>
Hayes, Frederick Augustus LL.B., Bangor Theological Seminary, 1929	<i>Major Soc. Science</i>	<i>Penacook</i>
Hickey, Joseph William B.S., New Hampshire, 1937	<i>Major Chemistry</i>	<i>East Rochester</i>

## GRADUATE SCHOOL

NAME	COURSE	P.O. ADDRESS
Hill, Elizabeth Lewis B.S. Ed., Lowell Teachers' College, 1935	<i>Major Education</i>	<i>Dover</i>
Karkavelas, Paul George B.S., New Hampshire, 1937	<i>Major Entomology</i>	<i>Dover</i>
Lamoureux, Lucille Louise A.G., Regis College, 1936	<i>Major French</i>	<i>Gardner, Mass.</i>
Lampesis, Peter Theodore B.S., New Hampshire, 1937	<i>Major Zoölogy</i>	<i>Dover</i>
MacLeod, Helen Patricia B.S., University of Saskatche- wan, 1928	<i>Major Bacteri- ology</i>	<i>Durham</i>
Meador, Elwyn Marshall B.S., New Hampshire, 1937	<i>Major Horti- culture</i>	<i>Rochester</i>
Mellon, Edward F. A.B., Allegheny, 1937	<i>Major Chemistry</i>	<i>Niagara Falls, N. Y.</i>
Miller, Wilbur Hobart B.S., New Hampshire, 1936	<i>Major Chemistry</i>	<i>Raymond</i>
Naghski, Joseph B.S., Cornell University, 1936	<i>Major Bacteri- ology</i>	<i>Garrattsville, New Lisbon, N. Y.</i>
Palmer, John Henry B.S., New Hampshire, 1936	<i>Major History</i>	<i>Rochester</i>
Parsons, Jr., Carl Ellsworth B.A., New Hampshire, 1937	<i>Major French</i>	<i>Dover</i>
Phaneuf, Jacqueline Marie B.S.E., Lowell Teachers' College, 1937	<i>Major French</i>	<i>Nashua</i>
Phipps, May Ellen B.S.Ed., Boston University, 1933	<i>Major Education</i>	<i>Milton, Mass.</i>
Pierce, Dorothy B.S., Sargent College, 1937	<i>Major Education</i>	<i>Leominster, Mass.</i>
Pierce, Elwood Clifton B.S., Ohio State, 1937	<i>Major Bio.- Chemistry</i>	<i>Warren, Ohio</i>
Powers, Wendell Holmes B.S., Middlebury College, 1937	<i>Major Chemistry</i>	<i>Richford, Vermont</i>

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NAME	COURSE	P.O. ADDRESS
Rafferty, Terrance John B.A., New Hampshire, 1934; M.A., New Hampshire, 1937	<i>Major French</i>	<i>Portsmouth</i>
Rhome, Margaret Katherine B.A., New Hampshire, 1935	<i>Major History</i>	<i>Jefferson</i>
Rosen, Bernard David B.S., New Hampshire, 1937	<i>Major Chemistry</i>	<i>Portsmouth</i>
Rowell, Barbara B.A., New Hampshire, 1933	<i>Major English</i>	<i>Bristol</i>
Serenbetz, Claire Winifred B.A., Adelphi College, 1937	<i>Major English</i>	<i>Ozone Park, N. Y.</i>
Silcox, Herbert Ernest B.S., New Hampshire, 1936	<i>Major Chemistry</i>	<i>Durham</i>
Smith, Howard Weedon B.S., New Hampshire, 1937	<i>Major Entomology</i>	<i>New Ipswich</i>
Smith, Raymond B.S., New Hampshire, 1937	<i>Major Bacteri- ology</i>	<i>Derry</i>
Spinney, Fannie Mae B.A., New Hampshire, 1922	<i>Major French</i>	<i>Dover</i>
Steere, Lois Erena B.E., Keene Normal School, 1937	<i>Major Education</i>	<i>Durham</i>
Teeri, Arthur E. B.S., New Hampshire, 1937	<i>Major Chemistry</i>	<i>Durham</i>
Torrey, Margaret Elizabeth B.E., Keene Normal School, 1935	<i>Major Education</i>	<i>Keene</i>
Trickey, Gertrude May B.S., New Hampshire, 1937	<i>Major Education</i>	<i>Alton Bay</i>
Vier, Dwayne Trowbridge B.S., New Hampshire, 1937	<i>Major Chemistry</i>	<i>Dover</i>
Waegeneere, Marguerite Eugenie B.Ed., Plymouth Normal School, 1932	<i>Major French</i>	<i>Manchester</i>
Weeks, Walter Drury B.S., New Hampshire, 1936	<i>Major Horti- culture</i>	<i>Laconia</i>
Wilson, Stanley Edward B.S., New Hampshire, 1926	<i>Major Horti- culture</i>	<i>Dover</i>
Wright, Neva Marie B.L.I., Emerson College, 1926	<i>Major English</i>	<i>Johnson City, N. Y.</i>





